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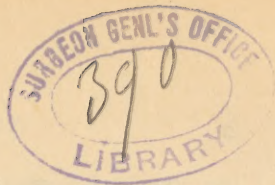
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Additional Notes on Forcible Over-Correction, in the
Treatment of Rigid Flat-foot.

By ROYAL WHITMAN, M. D., M. R. C. S.,
New York.





ADDITIONAL NOTES ON FORCIBLE OVER-COR-
RECTION, IN THE TREATMENT OF RIGID
FLAT-FOOT.

By ROYAL WHITMAN, M. D., M. R. C. S.,
OF NEW YORK.

IN considering the question of the radical cure of flat-foot as distinct from simple relief of symptoms, it is very evident that the proper position and functions of the foot must be regained before we may hope for permanent cure.

When the normal foot rests upon the ground the weight line of the body falls through the centre of the heel behind and in a line with the second toe in front.

The foot is perfectly balanced by its various muscles; flexion is combined with abduction, extension with adduction, and in order that the normal walk may be perfectly carried out these movements must be free and unrestrained.

The outer border of the foot, solidly braced by ligaments and usually in direct contact with the sole of the shoe bears, the first shock of weight, while the inner, freely movable portion, terminating in the powerful great toe, supplies the elastic element or spring at the termination of the step when the foot is extended and *adducted*.

In the flat-foot in addition to the sunken arch, as a result and consequence of weakened muscles and displacement of component parts, there is not only an abduction at the medio-tarsal joint, so that the weight line falls inside the great toe, but in addition a voluntary eversion of the foot to avoid activity, which has become painful. Thus the patient walks with the cloddy everted step, substituting flexion at the knee and the simple up and down or hinge motion at the ankle-joint, for the normal activity of the foot itself. More and more strain is thus brought upon the arch and upon its ligaments which should be perfectly protected by muscular activity.

Thus the affection progresses, the deformity becomes more marked and disabling, and with the malposition follow developmental changes in the shape of the bones and the low grades of inflammation usually classed as rheumatic.

On examination then of a well developed and painful flat-foot we shall inevitably find that one motion, the most important of all, that of adduction or the power of turning the foot inward at the medio-tarsal joint, is lost. The muscles which should carry out this motion are weakened and atrophied from disuse, while those on the front and outer border of the foot are spasmodically contracted and resist passive correction of the deformity. There are inflammatory adhesions between the bones, contraction and shortening of ligaments on the outer, and relaxation and lengthening of those on the inner aspect of the foot. It is in this class of cases that etherization and forcible reposition are essential, and the manner in which this is accomplished is of the first importance.

Dr. Wood, in his excellent paper on flat-foot in the ANNALS OF SURGERY for November, mentions the method employed by Willett, and it is to be inferred that this is the forcible correction which he would recommend. Mr. Willett's manner of operating is described by Mr. Howard Marsh in Vol. 18 of St. Bartholomew's Hospital Reports (Notes on Orthopedic Surgery) as follows:

"The foot is kept as nearly as it can be at a *right-angle* to the leg, its internal border is then turned upwards and its anterior segment is then carried far inwards by rotation at the ball and socket joint, between the astragalus and scaphoid."

According to Mr. Marsh it may be necessary to repeat the operation in aggravated cases. The foot is kept for one month in a plaster bandage and further treatment carried out by prolonged rest alternating with tip-toe exercises and massage. Mr. Marsh is inclined to be dubious as to the advantage of braces in after treatment, but describes a rather cumbersome appliance composed of an upright leg support to which a foot brace is connected by a leather strap. This manner of forcible correction is very similar to that employed by the German surgeons. Hoffa minutely describes the procedure as follows (Lehrbuch der Orthopädischer Chirurgie, §, 697): "The foot is brought up to a *right angle* or beyond by division of the tendo Achilles, as recommended by Krause. In this dorsal flexed position the arch

is forcibly deepened by manipulation, and a plaster bandage applied. After several weeks the patient may walk about, wearing for many months a wooden bandage made in the shape of the corrected arch, laced in front so that it may be removed for massage and exercise." The criticisms which I would make on these methods of treatment are, first, when the foot is brought up to a right angle or beyond, it is and must be from the shape of the articulating surfaces of its joints *abducted*, adduction being to any extent in this position, impossible. Second, patients suffering from this affection are as a rule unable to allow themselves the prolonged rest required by Mr. Marsh, nor would they submit to the wooden bandages used by Dr. Hoffa.

The operation which I have recommended and performed in a large number of cases is forcible *over-correction* of the deformity not primarily for the purpose of replacing dislocated bones, but to forcibly overstretch all contracted parts and to break up adhesions which resist and restrain the movement of extension and adduction, the essential movement for carrying out the normal step.

To force a foot into the extreme position of adduction it must be extended (plantar flexed). This may be easily demonstrated on one's own foot. The operation then is as follows: The foot is forcibly moved in every direction to break up adhesions and is finally extended and twisted inward as far as possible. In this position contracted muscles, ligaments and fascia are stretched to their extreme limit, and weakened and lengthened tissues are relaxed. While this is the primary object of the operation the misplaced bones are and must be as far as is possible replaced in normal position, the os calcis is drawn downward and inward beneath the astragalus and the arch assumes its greatest depth.

Forcible over-correction can usually be accomplished by the hands alone, but in more resistant cases it is well to place the patient on a low bed, allowing the legs to hang over the edge; the foot can then be seized between the knees, and the necessary force supplied by the thigh muscles.

Although the reposition is often accompanied by a formidable cracking of adhesions the after symptoms are invariably slight. A well-fitting plaster bandage is applied in the over-

corrected position, and the patient allowed to walk about on canes or crutches. In one week the bandages are removed in order that casts of the feet may be taken for braces, the bandages are then re-applied in the same position.

At the end of three weeks all inflammatory appearances have usually disappeared, the patient is able to walk about with the braces and the detention from work is as a rule less than one month.

The essential movement of extension and adduction which has been attained by the forcible stretching, is assured by a daily inward twisting of the foot by, or under the supervision of the surgeon, until passive adduction and extension can be carried out without pain or resistance.

Voluntary assumption of the position becomes possible when the adductor muscles regain their power. I must again insist that it is not enough that the arch of the foot is deepened and that the foot appears perfectly normal, the muscles must regain their normal balance, for as long as the abductors restrain the necessary adduction and extension, the patient is in danger of relapse. This voluntary and involuntary resistance often persists long after pain and discomfort have disappeared, and it can only be overcome I believe by the passive stretching which I have before described. (*Vide N. Y. Medical Journal*, Feb. 27, 1892.) The brace is constantly worn and the displacement never allowed to recur. A waukenphast shoe is to be used, the heel of which is raised if necessary on the inner border, so that the weight line may fall slightly to the outer side. The patient is then instructed in the manner of walking and supporting weight. This is essential to success; he must no longer evert the feet, a position which brings all the weight and strain upon the weakened arch and brace, but must point them straight ahead or parallel to one another, so that he walks over his toes or, in other words, raises the body and flexes the foot in the normal manner by muscular activity. Each step is thus an active exercise by which muscular strength is increased, and the correct position of the foot assured. Walking is to be *encouraged* in the place of long continued rest as advocated by others. If the patient is obliged to stand constantly, the feet are relieved by changing their position, raising the body at times slightly on the toes or again throwing the

weight more on the outer border of the foot. The patient must be made to thoroughly understand and appreciate the fact that cure is not assured by a brace or by an operation, but by his own voluntary exertion. Although massage and technical exercises should be recommended, they may be discarded if we can succeed in freeing the foot from restraint so that passive adduction and extension are possible, supply the patient with a proper brace and shoe and assure ourselves that he walks in the proper manner. This means permanent cure.

For the purpose of comparison one hundred consecutive cases of flat-foot were taken from the records of the out-door department of the Hospital for Ruptured and Crippled. These patients all applied for treatment in the six-and-a-half months prior to November 1st of the present year.

In twenty-four the deformity, pain and rigidity were so great that forcible over-correction was recommended as a preliminary measure. This is, I think, about the usual proportion as seen in dispensary practice. These latter cases have been tabulated according to age and duration of symptoms. It is interesting to note that the class in which the deformity is greatest is the most favorable for permanent cure, as the patients are very amenable to treatment, lending an enthusiastic coöperation to the efforts of the surgeon; an element often lacking in cases of less severity.

Cases of Rigid Flat-foot.

	Age.	Duration.	Sex.	Double or Single.
1	21	3 mos.	M.	D.
2	17	1 month	F.	D.
3	22	3 mos.	M.	D.
4	17	3 years	M.	D.
5	17	1 year	F.	D.
6	11	1 year	M.	D.
7	15	1 year	M.	D.
8	15	1 year	F.	D.
9	11	2 mos.	M.	D.
10	14	4 mos.	F.	D.
11	14	. .	M.	D.
12	50	3 mos.	M.	D.
13	14	. .	M.	D.
14	42	. .	M.	S.

	Age.	Duration.	Sex.	Double or Singl
15	15	1 year	M.	D.
16	21	1 year	F.	D.
17	14	. .	M.	D.
18	13	1 year	F.	D.
19	38	1 year	F.	D.
20	13	. .	F.	D.
21	17	. .	F.	D.
22	19	1 year	M.	D.
23	18	. .	M.	D.
24	22	3 mos.	M.	D.

In addition to these cases of simple flat-foot there were five, of so-called chronic sprain of the ankle in which as a result of injury, the foot was rigidly held in an abducted position although the arch was normal in appearance. I have elsewhere called attention to the affection and its treatment.¹

To illustrate common types of severe flat-foot and the effect of treatment, the following cases may be quoted :

Case 1, (No. 4 in tabulated list). A boy, 17 years of age, had worked for three years as a printer. Having finally reached a position by which he became self-supporting, the constantly increasing pain and deformity of his feet, obliged him to give up work. He was, when he applied for treatment, a cripple, unfit for his own or any other occupation. On September 19, the operation of forcible over-correction was performed. One month later he returned to his work, the feet in normal position, with entire relief of pain and every prospect of permanent cure.

Case 2. A woman, aged 38, was brought to me for treatment on October 21, with the following history. Increasing pain and weakness of the feet for three years. She had been constantly treated for rheumatism by medicines, massage, baths, etc. The "lumps" on the inside of the feet had been blistered many times to reduce the swelling. She had been obliged to use crutches for three months, and "when in the house dragged herself about in a rocking-chair." In this case, by preliminary rest in plaster bandages, it was possible to bring the feet into proper position without etherization. She is now, November 10, able to walk without discomfort, although the muscles are still weak. In this type, when patients are debilitated

¹ "Persistent abduction of the foot." *New York Medical Journal*, October 11th, 1890.

from constant pain and loss of exercise, massage and tonics are of much importance. Of all tonics, however, the most effectual is the assurance of speedy and permanent relief of an affection considered hopeless.

Case 3. This will serve to illustrate the effect of treatment in the rheumatic type of weakened arch. A young man, 19 years of age, applied to me on July 19, 1890. He had suffered from constant pain in the feet for three years. As he was a salesman in one of the large instrument shops in New York, he had had the benefit of advice and treatment from various physicians, and had exhausted the ingenuity of his associates in the application of various supports. He was obliged finally to discard them all, and when I saw him he told me that he "had suffered so much pain and was so discouraged that he wished he were dead." The case to me seemed perfectly hopeless; the boy was emaciated and weak, both the knee and ankle-joints were swollen and infiltrated, the circumference of the ankle being greater than that of the calf. The toe-joints seemed ankylosed. There was no apparent flat-foot or any appreciable spasm. When weight was borne there was well marked abduction of the feet. As the first indication was evidently the relief of pain and improvement of the nutrition, he was not allowed to walk, was given cod liver oil and syrup of the hypophosphites and forced feeding. In the meantime a course of vigorous massage with prolonged soaking of the feet in hot water, was faithfully carried out. In three weeks, braces were applied, and he was allowed to walk about. I then lost sight of the patient, and supposed that he had relapsed. Last summer he came to see me, and to my surprise said that he had continued free from pain, and "had not lost a day's work in two years." His feet were then almost perfectly normal in appearance and function. He continues to wear the braces, although it is probable that they are no longer necessary.

Similar cases occasionally come under observation when as the result of general rheumatism the feet remain rigid and greatly deformed. In such cases I have not hesitated to recommend forcible correction of the deformity on the principle that whenever possible the normal relations of the foot as a weight bearer should be regained.

Case 4.—A young lady twenty years of age, was seen in consultation on March 3d, 1892, one and a half years before, the left ankle had been sprained. As the usual treatment failed to relieve the symptoms a specialist was consulted and a long course of daily treat-

ment carried out, including local and general massage, and the use of a leg brace. This support protected the joint somewhat, but the weakness, pain and inability to walk for any distance continued so that the patient had become a semi-invalid. The only complete relief experienced during this time was when the ankle was held in a plaster bandage, and crutches used. It was during the treatment of one of the recurrent sprains that I saw the patient. The condition and cause of the weakness was apparent. Although the foot was normal in appearance, when weight was borne the arch flattened, the fore foot turned outwards opening and exposing the astragalo-scapoid joint which was very sensitive to the slightest touch. As soon as the arch was properly supported the symptoms were completely relieved, and after a short course of local massage and exercises, the patient informed me that she had walked five miles without discomfort. When last seen a few weeks later, the only trace of the former trouble was a slight sensitiveness to deep pressure on the scaphoid bone.

Case 5. A delicate girl, eleven years of age, was referred to me on Oct. 25th, 1891, for weakness and deformity of the feet. A specialist had previously been consulted, who had advised leg supports, but the mother said the child was so sensitive that she considered the physical deformity of less consequence than the probable moral effect of the remedy. The feet were so weak that the patient was unable to raise the body on the toes; the deformity was very marked, and the child was awkward and easily fatigued. There was no pain, spasm or limitation of motion. The arch was supported, the child supplied with proper shoes and a course of exercises recommended, which I believe were never carried out. One year later the feet were perfectly normal in appearance and function, and the child is able to walk long distances without fatigue. I have never thought it necessary or advisable to use leg supports in any case of flat foot, or so-called weak ankles. When the arch is protected by a proper brace and shoe, and the weight of the body brought into the normal relation to the foot, the muscles rapidly regain their ability to protect the ankle.

I think it has been made clear that the method of treatment which aims at permanent cure by a reversal of the conditions under which the deformity has developed, differs essentially from efforts at relief of symptoms by applying braces without regard to the condition of the foot, and from those operations which would substitute an ankylosis of an important joint for muscular strength and activity.

More minute details of the treatment, the description of the brace used and the method of its manufacture may be found in the *New York Medical Journal* of February 27th, 1892.

The ability to apply a proper brace under proper conditions is essential to success. No one who has witnessed the immediate relief of pain from the application could doubt for a moment its efficiency or necessity. An habitually misplaced foot remains weak for a long time and must be held in position while the muscles regain their strength. Once the surgeon is familiar with its application and appreciates its use the field of therapeutic effort broadens to include not only the treatment of acquired flat-foot, but its prevention, by a recognition of its predisposing causes and early symptoms. In children, the cases of weak ankles of "growing out joints," those who are awkward and easily fatigued; in older subjects, the easily sprained ankle, the chronic sprains and the like, will be found very amenable to relief by treatment conducted on the principles laid down; that the weight of the body must fall normally on the foot, and that the muscles must be properly balanced and the walk carried out in the normal manner, whatever may have been the cause of the original deformity.

In conclusion I may take this opportunity of thanking the writers of the most recent articles on flat-foot, Drs. Wood,¹ Dane² and Dauriac³ for their kind references to my work on this subject.

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¹ *Annals of Surgery*, Nov. 1892.

² *Boston Medical and Surgical Journal*, Oct. 27th, Nov. 3d and 10th.

³ *Gazette des Hopitaux*, Sept. 10th, 1892.

